

Structural equation modelling: validation of career readiness model using psychological constructs

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ABSTRACT

The career readiness model is needed as a reference source for relevant parties, especially universities, to implement various career development and interventions initiatives. This study was conducted to assess the reliability and validity of personality, career efficacy, career readiness skills along with indicators using Partial Least Squares Structural Equation Modeling in forming a career readiness model. Results show that each construct achieved good reliability and validity through composite reliability (CR) readings recorded between 0.78 and 0.92 to measure internal consistency reliability, while convergent validity through average variance extracted (AVE) readings exceeded 0.5. The construct of this model had also achieved discriminant validity through the recorded readings of cross loading, Fornell-Larcker and HTMT confidence intervals which did not contain the value of 1. The findings also indicate that career efficacy and career readiness skills are accurate and relevant constructs for developing a career readiness model.

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1. INTRODUCTION

The transformation in the career market presents new challenges to the use of human resources due to changes in the required skill sets [1]. As potential employees in various economic sectors, students are responsible for preparing themselves with significant skills to be ready to work. Previous studies have presented many definitions of career readiness and the elements that students need to have career readiness. Previous studies have extensively explored and presented numerous definitions of career readiness, along with identifying the essential elements that students must possess to achieve career readiness.

Students' career readiness is always an issue that employers pay attention to [2]–[4]. Employers have highlighted various qualities that define a well-prepared student, encompassing self-confidence, effective communication, critical and analytical thinking, problem-solving abilities, and the capacity for independent work. Additionally, sought-after skills demanded by employers encompass attributes like responsibility, confidence, strong social skills, adaptability, teamwork spirit, a positive work attitude, and high motivation [5], [6]. However, students' perception of career readiness differs from that of employers, leading to uncertainties regarding the essential elements required in the job market [7]. Consequently, students encounter difficulties in prioritizing the necessary elements to achieve career readiness. Some students mistakenly believe that career readiness skills are primarily required in their future careers [8], while others lack awareness of how the skills they acquire within educational institutions directly relate to the demands of the career world [9].

Based on the existence of various challenges, this study seeks to investigate additional elements that can contribute to students' attainment of strong career readiness. These elements encompass qualities such as confidence, self-reliance, adaptability, and resilience in facing career market obstacles [10]–[15]. Recognizing the capacity of psychological factors to enhance human performance, particularly in the professional sphere [16], [17], the study considers the inclusion of psychological elements in career readiness. In Malaysia, the Ministry of Higher Education has outlined attributes that should be instilled in students to prepare them for the job market [18]. However, psychology elements have not been included among these attributes. Hence, the study aims to make predictions concerning these relevant components and psychological constructs within career readiness, ultimately leading to the development of a comprehensive career readiness model.

2. LITERATURE REVIEW

2.1. Career readiness definition

Career readiness refers to knowledge, skills and abilities that include several elements such as knowledge, skills, behavioral performance, time management, interpersonal skills and sufficient abilities to start a career path [19]. Career readiness is the situation of individuals who have the knowledge, skills and characteristics to draw and plan their future in a career context [20]. They have strategies for learning a job, basic expectations to behave as they would in the workplace and have specific knowledge about a career. They are also proactive, have resilience and can adapt in various situations to achieve a meaningful career future and give satisfaction in life. The behaviors that show a person has career readiness are they have social competence, variety of skills, positive career behavior, quality personality, and entrepreneurial skills [20]. An individual is said to have career readiness when they have completed the process of exploring, planning and making decisions regarding their career [21]. A student's career readiness is also linked to knowledge, skills or attributes, the ability to face the career challenges and the ability to stay in the job [22], [23].

2.2. Model framework

The career readiness model framework was developed based on Social Cognitive Career Theory (SCCT) as shown in Figure 1. This theory was chosen because of its ability to explain the transition scenario of students from the world of learning to the world of career through the relationship between cognitive factors and individual factors [24]. There are three elements involved in this theory, which are individual factors namely personality, career efficacy and goal or outcome expectations [25]. The selection of the constructs of this model refers to Career Development Theory to explain the expectation of goals that is career readiness, Personality Trait Theory by Cattell [26], [27] to explain personal factors that are personality traits, and Social Cognitive Theory to explain the cognitive factor that is career efficacy [28].

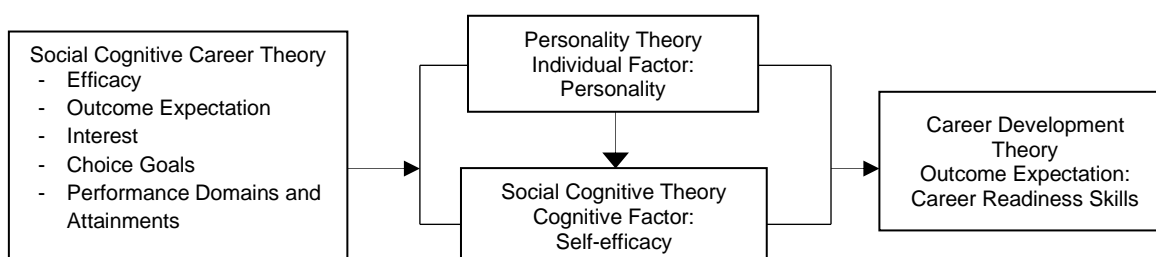


Figure 1. Career readiness model framework

2.3. Personality

Personality is a psychological element that describes an individual's character as a result of a combination of cognitive, affective and behavioral components that lead to individual differences [29]. These systems interact with each other to allow the development process to take place and subsequently influence the formation of certain behaviors. The role of personality can be conceptualized through the characteristics that influence individuals in forming a behavior [30]. The selection of personality variables is significant according to Lent, Brown and Hackett in which they emphasize that the factor that needs to be taken into account in developing a career is the individual's tendency to feel negative or positive when faced with a situation [25], [31], [32]. Personality is also believed to influence the development of a person's ability, skills and knowledge in a certain field [33].

Based on past studies in the field of career development, the approach through the application of psychological elements is a solution that can be considered because of its ability to stimulate human performance especially in the career world [34], [35]. One of those elements is personality, which is a set of unique individual characteristics that influence thinking, motivation and behavior in a situation [36], [37] and have an influence on the development of a person's skills, abilities and knowledge [33]. Personality traits can help explain the formation of everyone's behavior such as making career decisions in addition to being able to face challenges in the career world [38].

2.4. Career efficacy

Career efficacy is the core of an individual's belief in his own ability to achieve goals in various career aspects including decisions, behaviors and adaptation processes that affect career development. This allows a person to be able to determine what can be done with the skills they have [39]. Career efficacy is also defined as the core internal source of an individual's belief in his own ability to achieve goals through the integration of cognitive, social and behavioral skill components [40]. Through this belief, various aspects will be considered by the individual when faced with a challenge in which he will ensure the extent to which he is able to overcome the challenge. Pessimistic or optimistic thinking in the situation will create motivation that leads to self-adaptive actions through challenging targets and achieving expected goals [41].

In the career context, research shows that efficacy has a significant influence in the career world [42] such as encouraging individuals to explore career opportunities [43] and influencing the achievement of organizational goals through the willingness of employees to change their behaviors [16], [44]. Results from past studies show that the mastery of career readiness is closely related to the students' self-belief system or career efficiency to reach a level where they are able to act as human capital. In this study, the use of career efficacy refers to students' confidence, trust, capability, and self-ability in career readiness. Mastery in a field requires students to make judgments, choices, decisions, plans, take action, perform tasks, and explore career options. With confidence, trust, ability and capability, students can view themselves as human capital and continue functioning in their chosen career field without worrying about the probability of failure.

2.5. Career readiness skills

Career readiness refers to knowledge, skills and abilities that include several elements such as knowledge, behavioral performance, time management, interpersonal skills and sufficient abilities to start a career [19], [45]. An individual is considered to have career readiness when they understand the challenges faced, have strong personal support without help from others to face those challenges in addition to mastering the marketability dimension [45]. Gysbers defines career readiness as the situation of an individual who has the knowledge, skills and characteristics to draw and plan the future in terms of career [13]. They have strategies to engage in on-the-job training, have basic expectations for workplace behavior and have specific knowledge about a career. They are also proactive and have the resilience and adaptability to move themselves towards a meaningful career future, aiming to give satisfaction in life. Behaviors that are included in career readiness include social competence, diversity of skills, positive career behavior, personal qualities, personality and emotional state as well as entrepreneurial skills [20]. Super explained career readiness as perfection in self-development through competence, attitude, knowledge and skills [21]. An individual is considered to have career readiness once they have completed the processes of exploring, planning and making decisions about their career.

3. RESEARCH METHOD

The implementation of this study involves the collection of cross-sectional data from the study sample based on the main characteristics of the studied population. From the total population consisting of university students in the final year of their first degree, the determination of the number of samples was according to the sampling method suggested by the G*Power software calculation. The determination of sample size takes into account statistical power, significant levels and the number of predictor constructs or independent constructs. In this study, a total of six constructs were entered into the G*Power program and produced the results of the number of samples. At the 95% confidence level, at least 146 samples were required for a true effect (effect size) of 0.15 with a probability of error at a significant level of $\alpha=0.05$. This study also refers to the Partial Least Square (PLS) rule of thumb which is a multiple of 10 as suggested by Hair *et al.* [46]. The number is determined by counting the maximum number of paths directed to an endogenous construct in the structural model.

A total of three instruments were used to measure the skills of career readiness, personality and career efficiency of university students. The collected data was formatted in comma separated value (.csv) format before being analyzed using SmartPLS, which is a Structural Equation Model Partial Least Square (PLS-SEM) inference analysis software. To assess the validity and reality, the measurement assessment

PLS-SEM was used to examine the relationship between latent variables and their measuring constructs in the career readiness model [46], [47]. Assessment at this level involves confirmatory factor analysis to determine indicators that fit a construct based on loading values. The results of the study were obtained by obtaining composite reliability (CR) to represent internal consistency reliability, while reading outer loading or indicator reliability and average variance extracted (AVE) were used for convergent validity. Next, discriminant validity analysis was performed by evaluating three criteria, namely Fornell-Larcker, cross loading value and Heterotrait-Monotrait (HTMT) ratio as well as confidence interval (CI) value [48]. All the three instruments used Likert scales. Although interval data is one of the necessary conditions to use SEM-PLS, there are studies that state that a Likert scale can be used [49], [50]. This is because the Likert scale value that is written does not refer to the label but instead refers to the nature of the data [49].

4. RESULTS AND DISCUSSION

4.1. Internal consistency reliability

Internal consistency reliability is the main characteristic studied in the measurement model. In general, the internal consistency of an instrument is obtained when all items are positively correlated with each other in a construct. However, the measurement in PSL-SEM is different because each item is characterized by a specific loading that differs from each other which results in a value known as composite reliability (CR). Therefore, the internal consistency reliability of the study refers to the CR value produced.

Although there are different evaluation methods, the CR indicators and values are the same as Cronbach's alpha, which is between 0 and 1. The higher the CR value, the higher the reliability level of a construct. A value between 0.7 and 0.9 shows that the indicator has high internal consistency, but a value above 0.95 shows that the indicator measures the same phenomenon [46]. A value below 0.6 is considered as not achieving internal consistency reliability, but a value of 0.6 is acceptable in a survey-type study. The PLS algorithm method was used to obtain the CR value and the results can be seen in Table 1. The results show that all the constructs achieve a high level of internal consistency and are reliable based on the CR value recorded between 0.78 and 0.92 [46].

Table 1. Composite reliability value for the career readiness model construct

Construct/Sub-construct	Composite reliability
1. Career efficacy	0.89
- Physiological and emotional states	0.82
- Verbal persuasion	0.84
- Mastery experiences	0.84
- Vicarious experiences	0.79
2. Agreeableness	0.78
3. Extraversion	0.83
4. Emotional stability	0.82
5. Openness	0.84
6. Conscientiousness	0.83
7. Career readiness skills	0.92
- Communication	0.78
- Leadership	0.90
- Scholar	0.86
- Entrepreneurial	0.89
- Global	0.89
- Career development	0.89
- Adaptability	0.90
- Critical thinking	0.90
- Career specific skill	0.90
- Teamwork	0.91

4.2. Convergent validity

Convergent validity refers to the extent to which each indicator in one construct has a positive relationship with other indicators in the same construct. Each indicator in this reflective model should be measure the same construct and exhibit a high degree of variance with each other. This ensure the validity of the construct being measured. There are two criteria that need to be assessed in order to test convergent validity, namely the value of indicator reliability or outer loading and average variance extracted (AVE). The outer loading value for each indicator must be equal to or exceed the value of 0.708 [44], [45]. With the assumption that the variance between indicators needs to explain at least 50% of a construct, then the AVE value which is the square of the indicator reliability value is equal to or greater than 0.5 [44]. Therefore, the outer loading value below 0.708 can be ignored if the AVE value has been successfully achieved.

To obtain the AVE value, a factor analysis process was carried out and the items from some of the constructs that recorded a loading value below 0.708 were eliminated. PLS Algorithm was repeated every time an indicator was removed. In this research model, a total of 27 items from seven different constructs were removed to obtain an AVE value of at least 0.5. Table 2 shows the details of the constructs and indicators along with the outer loading values that went through the factor analysis process.

The factor analysis resulted in a final AVE value for all constructs at least at a value of 0.5. Based on Table 3, it was found that the constructs of extraversion, conscientiousness, agreeableness, emotional stability and openness, vicarious, communication and scholar had shown a final value of AVE (refer to the text in bold) that had been improved, above the value of 0.5. The result show that the items measuring all constructs have achieved convergent validity.

Table 2. AVE value (before and after factor analysis)

Algorithm No	Construct	AVE original value	Removed indicators	Outer loading value	AVE value (after PLS algorithm)
1	Agreeableness	0.228	P12	0.034	0.261
2			P27	0.055	0.299
3			P22	0.352	0.334
4			P37	0.202	0.393
5			P2	0.176	0.484
6	Conscientiousness	0.260	P7	0.645	0.548
7			P8	0.018	0.129
8			P18	0.129	0.169
9			P43	0.169	0.171
10			P23	0.171	0.489
11	Extraversion	0.341	P13	0.489	0.544
12			P31	0.166	0.384
13			P21	0.278	0.435
14			P6	0.444	0.485
15			P26	0.575	0.550
16	Openness	0.309	P41	0.060	0.344
17			P35	0.170	0.387
18			P44	0.445	0.418
19			P10	0.507	0.459
20			P30	0.482	0.519
21	Emotional stability	0.234	P29	0.063	0.277
22			P19	0.170	0.317
23			P4	0.187	0.374
24			P39	0.196	0.458
25			P14	0.198	0.598
26	Scholar	0.476	K3	0.603	0.507
27	Vicarious experiences	0.465	E8	0.635	0.554

Table 3. Comparison of AVE values of all constructs and sub-constructs before and after factor analysis

Construct/Sub-construct	AVE value	
	Before factor analysis	After factor analysis
Agreeableness	0.23	0.55
Conscientiousness	0.26	0.54
Extraversion	0.34	0.55
Openness	0.31	0.52
Emotional stability	0.23	0.60
Career readiness skills	0.53	0.53
- Adaptability	0.56	0.56
- Communication	0.44	0.65
- Critical thinking	0.57	0.57
- Global	0.54	0.54
- Leadership	0.57	0.57
- Scholar	0.48	0.51
- Entrepreneurial	0.50	0.50
- Teamwork	0.55	0.55
- Career development	0.54	0.54
- Career specific skill	0.57	0.57
Career efficacy	0.63	0.63
- Physiological and emotional states	0.54	0.54
- Verbal persuasion	0.58	0.58
- Mastery experiences	0.56	0.56
- Vicarious experiences	0.47	0.55

4.3. Discriminant validity

Discriminant validity refers to the extent to which indicators in a construct differ from indicators of other constructs evaluated in a model through correlation [46], [47]. This test can be evaluated based on three criteria, namely by evaluating cross loading on each indicator, the Fornell-Larcker criteria, and the Heterotrait-Monotrait (HTMT) correlation ratio as well as the CI value.

4.3.1. Cross loading criteria

The loading values for career readiness, personality traits, and career efficacy are shown through correlation values of each construct. The value recorded in a researched construct needs to record a higher value compared to other constructs to show that the indicator measures the construct and different from other constructs [46]. Figure 2 shows the loading values for the career readiness construct, whereas Table 4 shows the loading values for the personality and career efficacy constructs. It can be concluded that discriminant validity has been achieved through the loading value for a construct because it is different and higher than other constructs. This value also clearly shows that the items for each construct are in the right place.

	COM	COM_M	Thinking	Scholar	Leadership	Teamwork	Adaptability	Global	Enterpre	Spesi_Skill	Career_Dev
COM1	0.730	0.137	0.232	0.213	0.148	0.114	0.113	0.158	0.130	0.160	0.128
COM2	0.777	0.150	0.219	0.142	0.117	0.100	0.142	0.089	0.141	0.140	0.165
COM3	0.812	0.248	0.275	0.204	0.196	0.226	0.208	0.176	0.177	0.246	0.205
COM4	0.787	0.256	0.306	0.246	0.277	0.173	0.200	0.238	0.200	0.322	0.300
COM5	0.772	0.235	0.286	0.239	0.228	0.174	0.184	0.164	0.153	0.211	0.217
COM6	0.753	0.211	0.292	0.181	0.180	0.256	0.236	0.208	0.208	0.226	0.216
COM7	0.674	0.323	0.307	0.273	0.193	0.247	0.248	0.208	0.202	0.220	0.186
COM_M1	0.103	0.585	0.136	0.156	0.148	0.166	0.022	0.089	0.069	0.119	0.106
COM_M2	0.189	0.789	0.207	0.158	0.269	0.200	0.161	0.095	0.226	0.262	0.173
COM_M3	0.216	0.795	0.275	0.204	0.252	0.214	0.227	0.159	0.223	0.290	0.219
COM_M4	0.272	0.811	0.338	0.315	0.355	0.269	0.293	0.226	0.225	0.407	0.318
COM_M5	0.202	0.730	0.321	0.251	0.347	0.224	0.278	0.157	0.293	0.285	0.225
COM_M6	0.252	0.733	0.352	0.245	0.305	0.348	0.314	0.275	0.239	0.290	0.246
COM_M7	0.272	0.701	0.318	0.263	0.254	0.206	0.294	0.208	0.344	0.281	0.215
Thinking1	0.359	0.321	0.721	0.474	0.461	0.308	0.358	0.340	0.345	0.356	0.353
Thinking2	0.325	0.288	0.771	0.463	0.520	0.307	0.418	0.404	0.410	0.419	0.400
Thinking3	0.295	0.297	0.781	0.517	0.505	0.352	0.412	0.407	0.469	0.436	0.389
Thinking4	0.279	0.294	0.795	0.441	0.479	0.303	0.417	0.408	0.489	0.435	0.419
Thinking5	0.271	0.310	0.777	0.461	0.447	0.232	0.417	0.343	0.508	0.434	0.403
Thinking6	0.138	0.234	0.679	0.472	0.362	0.399	0.432	0.342	0.336	0.362	0.349
Thinking7	0.251	0.283	0.767	0.516	0.499	0.310	0.449	0.351	0.456	0.409	0.416
Scholar1	0.299	0.251	0.452	0.760	0.325	0.367	0.380	0.320	0.282	0.425	0.315
Scholar2	0.217	0.168	0.468	0.750	0.417	0.324	0.377	0.351	0.299	0.391	0.340
Scholar3	0.132	0.186	0.404	0.652	0.383	0.313	0.332	0.297	0.352	0.341	0.285
Scholar4	0.203	0.197	0.449	0.684	0.424	0.222	0.364	0.320	0.368	0.418	0.344
Scholar5	0.188	0.227	0.467	0.688	0.410	0.297	0.381	0.325	0.373	0.374	0.357
Scholar6	0.167	0.300	0.451	0.732	0.431	0.395	0.350	0.372	0.278	0.365	0.334
Leadership1	0.202	0.238	0.437	0.432	0.720	0.264	0.306	0.367	0.362	0.365	0.378
Leadership2	0.213	0.330	0.444	0.379	0.787	0.346	0.394	0.343	0.376	0.364	0.359
Leadership3	0.148	0.286	0.440	0.424	0.786	0.311	0.329	0.335	0.387	0.367	0.286
Leadership4	0.176	0.322	0.475	0.415	0.783	0.308	0.378	0.371	0.428	0.385	0.338
Leadership5	0.229	0.299	0.454	0.455	0.771	0.294	0.396	0.338	0.375	0.464	0.427
Leadership6	0.145	0.210	0.446	0.372	0.647	0.427	0.379	0.393	0.402	0.362	0.358
Leadership7	0.223	0.306	0.555	0.464	0.772	0.359	0.429	0.441	0.532	0.454	0.431
Teamwork1	0.100	0.352	0.209	0.194	0.300	0.609	0.380	0.290	0.201	0.288	0.216
Teamwork2	0.248	0.251	0.269	0.312	0.299	0.730	0.294	0.394	0.149	0.299	0.278
Teamwork3	0.152	0.237	0.287	0.357	0.330	0.785	0.441	0.464	0.236	0.361	0.382
Teamwork4	0.133	0.196	0.325	0.359	0.316	0.771	0.455	0.490	0.185	0.314	0.271
Teamwork5	0.160	0.259	0.305	0.347	0.344	0.802	0.415	0.431	0.213	0.297	0.285
Teamwork6	0.178	0.158	0.293	0.305	0.266	0.756	0.426	0.473	0.201	0.271	0.288
Teamwork7	0.277	0.279	0.375	0.411	0.393	0.786	0.436	0.452	0.269	0.382	0.377
Teamwork8	0.188	0.162	0.379	0.341	0.338	0.653	0.553	0.267	0.209	0.312	0.301
Adaptability1	0.188	0.249	0.407	0.341	0.313	0.429	0.700	0.360	0.382	0.389	0.345
Adaptability2	0.278	0.317	0.406	0.387	0.343	0.465	0.760	0.393	0.414	0.411	0.382
Adaptability3	0.187	0.235	0.445	0.397	0.380	0.354	0.747	0.362	0.348	0.366	0.359
Adaptability4	0.110	0.167	0.321	0.320	0.348	0.395	0.736	0.416	0.371	0.416	0.374
Adaptability5	0.129	0.230	0.443	0.401	0.425	0.411	0.790	0.475	0.445	0.419	0.396
Adaptability6	0.255	0.254	0.433	0.415	0.441	0.403	0.744	0.477	0.455	0.406	0.364
Adaptability7	0.177	0.210	0.417	0.415	0.352	0.396	0.766	0.472	0.435	0.448	0.394
Global1	0.138	0.235	0.409	0.361	0.453	0.472	0.425	0.746	0.464	0.358	0.435
Global2	0.196	0.133	0.366	0.317	0.286	0.254	0.329	0.630	0.366	0.311	0.364
Global3	0.227	0.228	0.409	0.408	0.376	0.459	0.425	0.785	0.358	0.408	0.415
Global4	0.192	0.227	0.347	0.381	0.368	0.482	0.433	0.769	0.323	0.461	0.375
Global5	0.131	0.092	0.355	0.341	0.305	0.436	0.430	0.761	0.315	0.414	0.352
Global6	0.108	0.131	0.287	0.285	0.346	0.352	0.463	0.732	0.405	0.478	0.425
Global7	0.221	0.164	0.351	0.298	0.387	0.389	0.400	0.717	0.450	0.458	0.397
Entrepreneurial1	0.114	0.216	0.388	0.228	0.376	0.103	0.307	0.369	0.685	0.386	0.425
Entrepreneurial2	0.076	0.210	0.412	0.321	0.433	0.151	0.415	0.377	0.745	0.425	0.501
Entrepreneurial3	0.142	0.242	0.380	0.279	0.359	0.044	0.305	0.300	0.746	0.371	0.417
Entrepreneurial4	0.333	0.269	0.495	0.396	0.429	0.211	0.434	0.395	0.795	0.506	0.464
Entrepreneurial5	0.124	0.220	0.355	0.261	0.347	0.127	0.363	0.384	0.715	0.377	0.355
Entrepreneurial6	0.116	0.199	0.399	0.323	0.388	0.281	0.416	0.394	0.687	0.480	0.372
Entrepreneurial7	0.217	0.254	0.419	0.385	0.392	0.282	0.428	0.374	0.678	0.457	0.395
Entrepreneurial8	0.145	0.191	0.370	0.364	0.361	0.377	0.398	0.350	0.604	0.407	0.333
Specific_skill1	0.186	0.258	0.391	0.366	0.339	0.256	0.389	0.388	0.424	0.715	0.494
Specific_skill2	0.224	0.241	0.397	0.392	0.387	0.303	0.430	0.464	0.497	0.767	0.500
Specific_skill3	0.202	0.327	0.434	0.388	0.413	0.333	0.389	0.408	0.479	0.737	0.467
Specific_skill4	0.187	0.305	0.360	0.376	0.301	0.323	0.327	0.380	0.377	0.682	0.437
Specific_skill5	0.201	0.309	0.391	0.435	0.439	0.386	0.446	0.441	0.508	0.775	0.521
Specific_skill6	0.259	0.276	0.393	0.445	0.404	0.277	0.427	0.418	0.438	0.811	0.501
Specific_skill7	0.264	0.301	0.470	0.445	0.472	0.371	0.447	0.452	0.459	0.771	0.506
Career Dev1	0.249	0.230	0.444	0.396	0.387	0.273	0.325	0.416	0.464	0.509	0.707
Career Dev2	0.272	0.227	0.396	0.400	0.333	0.387	0.421	0.420	0.426	0.523	0.777
Career Dev3	0.193	0.271	0.411	0.342	0.396	0.338	0.417	0.363	0.506	0.518	0.801
Career Dev4	0.120	0.217	0.315	0.288	0.370	0.277	0.300	0.358	0.382	0.402	0.691
Career Dev5	0.151	0.133	0.352	0.342	0.356	0.276	0.377	0.408	0.402	0.437	0.732
Career Dev6	0.185	0.204	0.342	0.288	0.333	0.274	0.345	0.403	0.382	0.485	0.738
Career Dev7	0.197	0.224	0.374	0.305	0.345	0.265	0.360	0.387	0.388	0.450	0.672

Figure 2. Cross-loading values of each item for the career readiness construct

Table 4. Cross-loading values of each item for the personality and career efficacy constructs

	Agree	Cons	Extra	Neuro	Openness	Emotional	Vicarious	Verbal	Vicarious
P17- Agree	0.792	0.258	0.372	0.192	0.278	0.285	0.198	0.208	0.223
P42- Agree	0.761	0.400	0.396	0.150	0.131	0.322	0.194	0.262	0.274
P32- Agree	0.662	0.448	0.333	0.145	0.211	0.276	0.231	0.226	0.209
P28- Cons	0.455	0.783	0.449	0.209	0.267	0.310	0.299	0.306	0.353
P33- Cons	0.432	0.833	0.518	0.324	0.413	0.431	0.289	0.355	0.471
P3- Cons	0.201	0.669	0.310	0.126	0.324	0.320	0.258	0.279	0.352
P38- Cons	0.246	0.747	0.492	0.240	0.366	0.356	0.241	0.296	0.371
P11- Extra	0.300	0.486	0.814	0.302	0.356	0.450	0.256	0.405	0.441
P1- Extra	0.191	0.238	0.628	0.111	0.166	0.284	0.204	0.238	0.277
P16- Extra	0.496	0.573	0.864	0.356	0.455	0.458	0.304	0.395	0.497
P36- Extra	0.376	0.394	0.694	0.183	0.162	0.390	0.227	0.354	0.344
P24- Emo Sta	0.087	0.157	0.204	0.653	0.251	0.207	0.140	0.178	0.168
P9- Emo Sta	0.145	0.229	0.322	0.829	0.296	0.315	0.256	0.284	0.295
P34- Emo Sta	0.254	0.355	0.300	0.825	0.321	0.286	0.272	0.278	0.306
P5- Open	0.219	0.333	0.263	0.298	0.780	0.311	0.188	0.291	0.353
P15- Open	0.237	0.431	0.448	0.300	0.771	0.348	0.194	0.238	0.425
P20- Open	0.248	0.306	0.267	0.194	0.720	0.305	0.176	0.218	0.252
P25- Open	0.150	0.280	0.309	0.347	0.785	0.314	0.170	0.327	0.295
P40-Open	0.239	0.399	0.194	0.231	0.585	0.255	0.180	0.221	0.245
E13- Emotional	0.251	0.338	0.396	0.266	0.283	0.805	0.458	0.535	0.623
E19- Emotional	0.399	0.396	0.405	0.251	0.349	0.715	0.306	0.517	0.584
E3- Emotional	0.178	0.310	0.384	0.295	0.336	0.729	0.411	0.543	0.583
E7- Emotional	0.346	0.330	0.416	0.222	0.259	0.673	0.361	0.409	0.520
E1- Vicarious	0.183	0.256	0.285	0.232	0.129	0.425	0.760	0.425	0.425
E11- Vicarious	0.321	0.319	0.311	0.239	0.228	0.423	0.755	0.404	0.393
E14- Vicarious	0.089	0.196	0.126	0.192	0.176	0.317	0.718	0.306	0.302
E12- Verbal	0.334	0.382	0.416	0.226	0.291	0.607	0.497	0.756	0.531
E18- Verbal	0.237	0.317	0.393	0.233	0.273	0.480	0.330	0.751	0.506
E4- Verbal	0.149	0.255	0.326	0.266	0.226	0.523	0.371	0.777	0.481
E9- Verbal	0.213	0.270	0.324	0.269	0.270	0.462	0.348	0.747	0.427
E16- Mastery	0.181	0.359	0.396	0.238	0.355	0.559	0.340	0.507	0.727
E2- Mastery	0.218	0.382	0.401	0.224	0.297	0.573	0.440	0.540	0.760
E20- Mastery	0.298	0.379	0.405	0.324	0.338	0.681	0.345	0.516	0.777
E6- Mastery	0.255	0.414	0.436	0.240	0.331	0.553	0.398	0.359	0.735

4.3.2. Fornell-Larcker criteria

Fornell-Larcker criteria can be referred to as a second approach to assess discriminant validity through a comparison of the AVE root value for each study construct [46]. The value of variance in a construct recorded a larger or higher value than the variance of another construct. Table 5 shows the results of the evaluation of the Fornell-Larcker criteria. The reading value was placed at the top and rightmost part of each column and row. The AVE root value of agreeableness (0.740), conscientiousness (0.737), career efficacy (0.796), extraversion (0.742), career readiness (0.728), emotional stability (0.773) and openness (0.720) was higher than the correlation value of other constructs. This results clearly shows that the constructs are different from each other.

Table 5. Fornell-Larcker criteria for major constructs

	1	2	3	4	5	6	7
Agreeableness	0.740						
Conscientiousness	0.460	0.737					
Career efficacy	0.453	0.569	0.796				
Extraversion	0.477	0.588	0.610	0.742			
Career readiness skills	0.445	0.541	0.644	0.576	0.728		
Emotional stability	0.220	0.313	0.424	0.343	0.370	0.773	
Openness	0.301	0.497	0.559	0.411	0.552	0.384	0.720

4.3.3. Heterotrait-Monotrait (HTMT) criteria

Heterotrait-Monotrait (HTMT) criteria is a new approach to test discriminant validity that exists as an alternative to improving the Fornell-Larcker criteria. HTMT refers to the ratio between the correlation within a construct and the correlation between constructs. Values above 0.90 are considered not to achieve discriminant validity. In addition, HTMT also refers to confidence interval values that do not contain a value of 1.0 for each construct [48]. Table 6 shows that all the recorded values are less than HTMT 0.90 and HTMT 0.85. The confidence interval value recorded by the construct of this study also did not contain a value of 1.0. This result demonstrates that the construct validity of the study has been successfully

established. Through cross-loading, Fornell-Larcker and HTMT criteria, it has been confirmed that discriminant validity exists among all constructs in the study model. Each construct is distinct and measures phenomena that are not captured by other constructs [50].

Table 6. Heterotrait-Monotrait ratio of correlations criteria

	Agreeableness	Conscientiousness	Career efficacy	Extraversion	Career readiness skills
Conscientiousness	0.716 CI (0.585, 0.836)				
Career efficacy	0.666 CI (0.548, 0.780)	0.732 CI (0.623, 0.823)			
Extraversion	0.696 CI (0.550, 0.826)	0.765 CI (0.637, 0.872)	0.760 CI (0.670, 0.843)		
Career readiness skills	0.597 CI (0.487, 0.705)	0.666 CI (0.562, 0.758)	0.745 CI (0.671, 0.807)	0.688 CI (0.594, 0.771)	
Emotional stability	0.331 CI (0.174, 0.499)	0.424 CI (0.263, 0.575)	0.557 CI (0.423, 0.680)	0.448 CI (0.303, 0.582)	0.453 CI (0.341, 0.557)
Openness	0.453 CI (0.294, 0.609)	0.668 CI (0.510, 0.790)	0.723 CI (0.610, 0.817)	0.498 CI (0.343, 0.633)	0.649 CI (0.532, 0.742)

CI=Confidence interval

4.3.4. Structural assessment PLS-SEM

After obtaining the reliability and validity of each construct, structural analysis is conducted to identify the relationships between the respective constructs in developing the model. As seen in Table 7 and Figure 3, the results of the analysis show agreeableness ($\beta=0.104$, $t=2.165$), extraversion ($\beta=0.191$, $t=2.165$), openness ($\beta=0.218$, $t=3.745$) and career efficacy ($\beta=0.283$, $t=4.521$) had a significant direct effect on career readiness at the 95% confidence level. The findings also show that all personality traits namely, agreeableness ($\beta=0.127$, $t=2.929$), conscientiousness ($\beta=0.159$, $t=2.966$), extraversion ($\beta=0.299$, $t=6.181$), emotional stability ($\beta=0.143$, $t=2.964$) and openness ($\beta=0.265$, $t=4.253$) had a significant direct effect on career efficacy.

The coefficient of determination (R^2) and predictive relevance (Q^2) values were obtained to assess the expected accuracy and the relevance of constructs used in developing the career readiness model as shown in Table 8. The variance effect shown by career readiness skills and career efficacy was at 0.53 and 0.54. The developed model is also evaluated in terms of relevance in predicting career readiness model by obtaining the Stone-Geisser's or Q^2 score. The Q^2 score greater than zero for the dependent constructs indicates that the developed forecasting model is relevant. The analysis results show that the Q^2 scores for career efficacy and career readiness skills constructs are 0.32 and 0.26.

Table 7. Relationship between personality, career readiness skill and career efficacy

Hypothesis	Relationship	β	t	p	Finding
H _{a1}	Agreeableness -> Career readiness skills	0.104	2.165	0.040	Supported
H _{a2}	Conscientiousness -> Career readiness skills	0.098	1.746	0.088	Rejected
H _{a3}	Extraversion -> Career readiness skills	0.191	3.423	0.000	Supported
H _{a4}	Emotional stability -> Career readiness skills	0.048	1.070	0.259	Rejected
H _{a5}	Openness -> Career readiness skills	0.218	3.745	0.000	Supported
H _{a6}	Career efficacy -> Career readiness skills	0.283	4.521	0.000	Supported
H _{a7}	Agreeableness -> Career efficacy	0.127	2.929	0.004	Supported
H _{a8}	Conscientiousness -> Career efficacy	0.159	2.966	0.002	Supported
H _{a9}	Extraversion -> Career efficacy	0.299	6.181	0.000	Supported
H _{a10}	Emotional stability -> Career efficacy	0.143	2.964	0.003	Supported
H _{a11}	Openness -> Career efficacy	0.265	4.253	0.000	Supported

Table 8. Values of coefficient of determination and predictive relevance

	Coefficient of determination R^2	Level	Predictive relevance Q^2	Level
Career readiness skills	0.53	Moderate	0.26	Moderate
Career efficacy	0.54	Moderate	0.32	Moderate

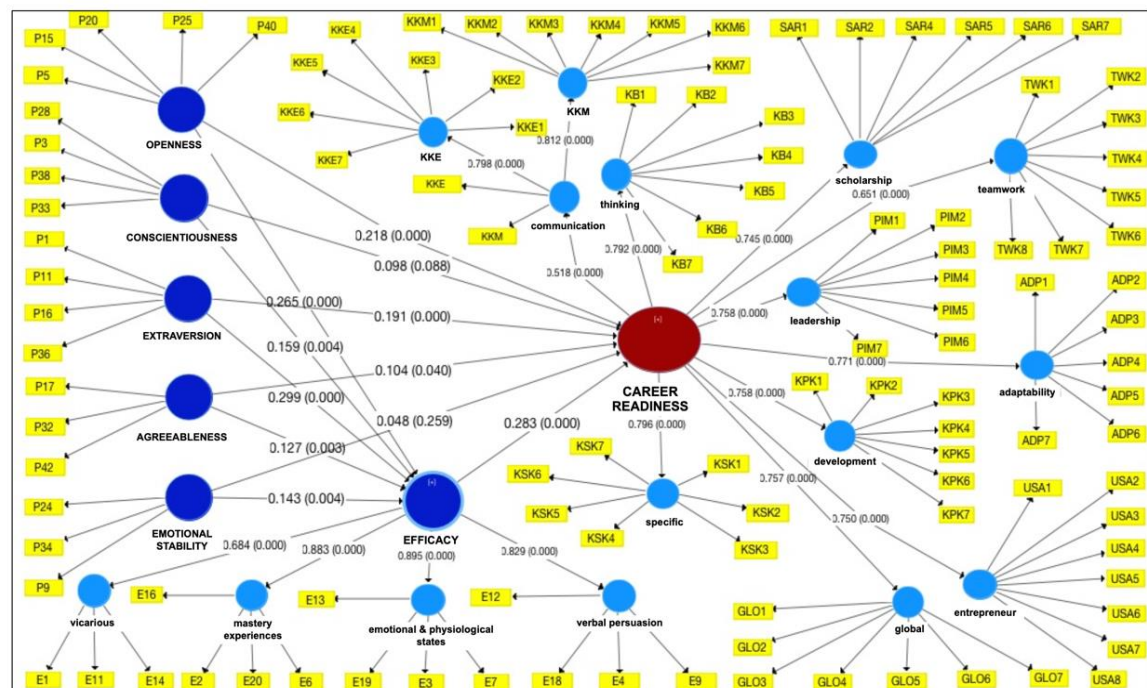


Figure 3. Career readiness path model in PLS-SEM

5. CONCLUSION

The objective of this study is to analyze the reliability and validity of personality, career efficacy, and career readiness skills in predicting the development of a career readiness model for university students in Malaysia. Additionally, the study aims to make predictions on all constructs involved in developing a career readiness model. The analysis results indicate that three personality traits, namely agreeableness, extraversion, and openness, have a significant direct effect on career readiness skills, while conscientiousness and emotional stability do not show a significant direct effect. However, both of these traits require career efficacy to help generate students' career readiness skills. The findings also demonstrate that career efficacy and career readiness skills moderately predict the development of the career readiness model. These results support the inclusion of psychological constructs in the formation of a career readiness model for students in Malaysia higher education institutions.

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